

That which is claimed is:

1. An integrated circuit device comprising:
  - a substrate;
  - a first conductive electrode on the substrate, the first conductive electrode having an electrode wall extending away from the substrate;
  - an insulating spacer on the electrode wall wherein portions of the electrode wall are free of the insulating spacer between the substrate and the insulating spacer;
  - a capacitor dielectric layer on portions of the first conductive electrode free of the spacer; and
  - a second conductive electrode on the capacitor dielectric layer opposite the first conductive electrode, wherein a thickness of the insulating spacer between the first and second conductive electrodes is greater than a thickness of the capacitor dielectric layer between the first and second conductive electrodes.
2. An integrated circuit device according to Claim 1 wherein the capacitor dielectric layer and the insulating spacer comprise different materials.
3. An integrated circuit device according to Claim 1 further comprising:
  - a transistor on the substrate;
  - an insulating layer between the substrate and the first conductive electrode;and
  - a conductive plug providing electrical coupling between the first conductive electrode and a source/drain region of the transistor through the insulating layer.
4. An integrated circuit device according to Claim 1 wherein portions of the electrode wall extend beyond the spacer away from the substrate free of the insulating spacer, and wherein the capacitor dielectric layer is also on portions of the electrode wall extending beyond the spacer.

5. An integrated circuit device according to Claim 1 wherein the electrode wall includes a recessed portion and wherein the insulating spacer is on the recessed portion of the electrode wall.

6. A method of forming an integrated circuit device, the method comprising:

forming a first conductive electrode on a substrate, the first conductive electrode having an electrode wall extending away from the substrate;

forming an insulating spacer on the electrode wall wherein portions of the electrode wall are free of the insulating spacer between the substrate and the insulating spacer;

forming a capacitor dielectric layer on portions of the first conductive electrode free of the spacer; and

forming a second conductive electrode on the capacitor dielectric layer opposite the first conductive electrode, wherein a thickness of the insulating spacer between the first and second conductive electrodes is greater than a thickness of the capacitor dielectric layer between the first and second conductive electrodes.

7. A method according to Claim 6 wherein the capacitor dielectric layer and the insulating spacer comprise different materials.

8. A method according to Claim 6 further comprising:

forming a transistor on the substrate;

forming an insulating layer between the substrate and the first conductive electrode; and

forming a conductive plug providing electrical coupling between the first conductive electrode and a source/drain region of the transistor through the insulating layer.

9. A method according to Claim 6 wherein portions of the electrode wall extend beyond the spacer away from the substrate free of the insulating spacer, and wherein the capacitor dielectric layer is also on portions of the electrode wall extending beyond the spacer.

10. A method according to Claim 6 wherein the electrode wall includes a recessed portion and wherein the insulating spacer is on the recessed portion of the electrode wall.

11. An electronic device comprising:  
a substrate;  
a conductive electrode on the substrate, the conductive electrode having an electrode wall extending away from the substrate; and  
an insulating spacer on the electrode wall wherein portions of the electrode wall are free of the insulating spacer between the substrate and the insulating spacer.

12. An electronic device according to Claim 11 wherein portions of the electrode wall extend from the insulating spacer away from the substrate free of the insulating spacer.

13. An electronic device according to Claim 11 wherein the electrode wall includes a recessed portion and wherein the insulating spacer is on the recessed portion of the electrode wall.

14. An electronic device according to Claim 11 wherein the electrode wall is closed thereby defining an inside of the electrode wall and an outside of the electrode wall.

15. An electronic device according to Claim 14 wherein the electrode wall defines a cylinder.

16. An electronic device according to Claim 11 further comprising:  
a capacitor dielectric layer on portions of the conductive electrode free of the spacer.

17. An electronic device according to Claim 16 further comprising:  
a second conductive electrode on the capacitor dielectric layer opposite the first electrode.

18. An electronic device according to Claim 17 wherein the spacer has a first thickness separating the conductive electrodes, wherein the capacitor dielectric layer has a second thickness separating the conductive electrodes, and wherein the first thickness is greater than the second thickness.

19. An electronic device according to Claim 11 wherein the substrate includes a transistor and wherein the conductive electrode is electrically coupled with a source/drain region of the transistor.

20. An electronic device according to Claim 11 further comprising:  
a sacrificial layer on the substrate, wherein the sacrificial layer has a thickness on the substrate such that the sacrificial layer extends to the insulating spacer and wherein the sacrificial layer and the insulating spacer comprise different materials.

21. A method of forming an electronic device, the method comprising:  
forming a conductive electrode on a substrate, the conductive electrode having an electrode wall extending away from the substrate; and  
forming an insulating spacer on the electrode wall wherein portions of the electrode wall are free of the insulating spacer between the substrate and the insulating spacer.

22. A method according to Claim 21 wherein portions of the electrode wall extend from the insulating spacer away from the substrate free of the insulating spacer.

23. A method according to Claim 21 wherein the electrode wall includes a recessed portion and wherein the insulating spacer is formed on the recessed portion of the electrode wall.

24. A method according to Claim 23 wherein the recessed portion of the electrode wall extends from the insulating spacer away from the substrate free of the insulating spacer.

25. A method according to Claim 21 further comprising:  
forming a capacitor dielectric layer on portions of the conductive electrode free of the spacer.

26. A method according to Claim 25 further comprising:  
forming a second conductive electrode on the capacitor dielectric layer opposite the first electrode.

27. A method according to Claim 26 wherein the spacer has a first thickness separating the conductive electrodes, wherein the capacitor dielectric layer has a second thickness separating the conductive electrodes, and wherein the first thickness is greater than the second thickness.

28. A method according to Claim 21 wherein the electrode wall is closed thereby defining an inside of the wall and an outside of the electrode wall.

29. A method according to Claim 28 wherein the electrode wall defines a cylinder.

30. A method according to Claim 21 further comprising:  
forming a sacrificial layer on the substrate, the sacrificial layer having a hole therein;  
wherein forming the conductive electrode includes forming the electrode wall on a sidewall of the hole in the sacrificial layer.

31. A method according to Claim 30 further comprising:  
removing a portion of the sacrificial layer to expose a portion of the electrode wall while maintaining a portion of the sacrificial layer between the exposed portion of the electrode wall and the substrate.

32. A method according to Claim 30 wherein the sacrificial layer and the insulating spacer comprise different materials.

33. A method according to Claim 31 wherein forming the insulating spacer comprises forming the insulating spacer on the exposed portion of the electrode wall.

34. A method according to Claim 33 further comprising:  
after forming the insulating spacer, removing portions of the sacrificial layer between the insulating spacer and the substrate.

35. A method according to Claim 31 wherein removing a portion of the sacrificial layer comprises removing at least approximately 200Å of the sacrificial layer.

36. A method according to Claim 35 wherein at least approximately 10,000Å of the sacrificial layer remain after removing at least approximately 200Å of the sacrificial layer.

37. A method according to Claim 36 wherein a length of portions of the electrode between the substrate and the insulating spacer is at least approximately 10,000Å.

38. A method according to Claim 21 wherein the substrate includes a transistor and wherein the conductive electrode is electrically coupled with a source/drain region of the transistor.

39. A method according to Claim 21 further comprising:  
forming a sacrificial layer on the substrate wherein the sacrificial layer has a thickness on the substrate such that the sacrificial layer extends to the insulating spacer and wherein the sacrificial layer and the insulating spacer comprise different materials.

40. An electronic device comprising:  
a substrate; and  
a conductive electrode on the substrate, the conductive electrode having an electrode wall extending away from the substrate, the electrode wall including a recessed portion at an end thereof opposite the substrate.

41. An electronic device according to Claim 40 further comprising:  
an insulating spacer on the recessed portion of the electrode wall wherein portions of the electrode wall are free of the insulating spacer between the substrate and the insulating spacer.

42. An electronic device according to Claim 41 wherein portions of the electrode wall extend from the insulating spacer away from the substrate free of the insulating spacer.

43. An electronic device according to Claim 40 wherein the electrode wall is closed thereby defining an inside of the electrode wall and an outside of the electrode wall.

44. An electronic device according to Claim 43 wherein the electrode wall defines a cylinder.

45. An electronic device according to Claim 40 further comprising:  
a capacitor dielectric layer on portions of the conductive electrode.

46. An electronic device according to Claim 45 further comprising:  
a second conductive electrode on the capacitor dielectric layer opposite the first electrode.

47. An electronic device according to Claim 46 further comprising:  
an insulating spacer on the recessed portion of the electrode wall wherein portions of the electrode wall are free of the insulating spacer between the substrate and the insulating spacer wherein the spacer has a first thickness separating the conductive electrodes, wherein the capacitor dielectric layer has a second thickness separating the conductive electrodes, and wherein the first thickness is greater than the second thickness.

48. An electronic device according to Claim 40 wherein the substrate includes a transistor and wherein the conductive electrode is electrically coupled with a source/drain region of the transistor.

49. An electronic device according to Claim 40 further comprising:  
a sacrificial layer on the substrate, wherein the sacrificial layer has a thickness on the substrate such that the sacrificial layer extends to the recessed portion of the electrode wall and wherein the recessed portion of the electrode wall is free of the sacrificial layer.



50. A method of forming an electronic device, the method comprising:  
forming a conductive electrode on a substrate, the conductive electrode  
having an electrode wall extending away from the substrate; and  
forming a recessed portion at an end of the electrode wall opposite the  
substrate.

51. A method according to Claim 50 further comprising:  
forming an insulating spacer on the recessed portion of the electrode wall  
wherein portions of the electrode wall are free of the insulating spacer between the  
substrate and the insulating spacer.

52. A method according to Claim 51 wherein portions of the electrode wall  
extend from the insulating spacer away from the substrate free of the insulating  
spacer.

53. A method according to Claim 51 wherein the recessed portion of the  
electrode wall extends from the insulating spacer away from the substrate free of  
the insulating spacer.

54. A method according to Claim 50 further comprising:  
forming a capacitor dielectric layer on portions of the conductive electrode.

55. A method according to Claim 54 further comprising:  
forming a second conductive electrode on the capacitor dielectric layer  
opposite the first electrode.

56. A method according to Claim 55 further comprising:  
forming an insulating spacer on the recessed portion of the electrode wall  
wherein portions of the electrode wall are free of the insulating spacer between the  
substrate and the insulating spacer wherein the spacer has a first thickness

separating the conductive electrodes, wherein the capacitor dielectric layer has a second thickness separating the conductive electrodes, and wherein the first thickness is greater than the second thickness.

57. A method according to Claim 50 wherein the electrode wall is closed thereby defining an inside of the wall and an outside of the electrode wall.

58. A method according to Claim 57 wherein the electrode wall defines a cylinder.

59. A method according to Claim 50 further comprising:  
forming a sacrificial layer on the substrate, the sacrificial layer having a hole therein;

wherein forming the conductive electrode includes forming the electrode wall on a sidewall of the hole in the sacrificial layer.

60. A method according to Claim 59 further comprising:  
before forming the recessed portion of the electrode wall, removing a portion of the sacrificial layer to expose a portion of the electrode wall while maintaining a portion of the sacrificial layer between the exposed portion of the electrode wall and the substrate.

61. A method according to Claim 60 wherein forming the recessed portion of the electrode wall comprises forming the recessed portion of the electrode wall at portions of the electrode wall exposed by the sacrificial layer.

62. A method according to Claim 61 further comprising:  
forming an insulating spacer on the recessed portion of the electrode wall wherein the sacrificial layer and the insulating spacer comprise different materials.

63. A method according to Claim 61 further comprising:

after forming the recessed portions of the electrode wall, removing a portion of the sacrificial layer between the recessed portions of the electrode wall and the substrate.

64. A method according to Claim 63 wherein removing a portion of the sacrificial layer comprises removing at least approximately 200Å of the sacrificial layer.

65. A method according to Claim 64 wherein at least approximately 10,000Å of the sacrificial layer remain after removing at least approximately 200Å of the sacrificial layer.

66. A method according to Claim 50 wherein a length of portions of the electrode wall between the substrate and the recessed portion is at least approximately 10,000Å.

67. A method according to Claim 50 wherein the substrate includes a transistor and wherein the conductive electrode is electrically coupled with a source/drain region of the transistor.